

## **REMARKS**

### **Telephone Interview Summary**

Applicant thanks the Examiner for taking the time to discuss the Final Office Action with their representative in Canada (Daphne L Maravei – Reg. #53,881) and inventor David Maenz in a telephone interview on October 30, 2008. In the telephone interview, claim amendments were proposed wherein claim 1 would be further clarified to include an amendment to specify that the inositol phosphates in step (a) are negatively charged due to the presence of one or more phosphates. Furthermore, an amendment was proposed for each of claims 2 and 4 to specify that the absence or presence of acid phosphatase in the phytase enzyme is limited to step (a) in claim 1. In the telephone interview, differences between the references cited by the examiner either alone or in combination, and the present invention were discussed and are summarized below.

### **Claim Amendments**

Claim 1 has been amended to recite that the inositol phosphates in step (a) are negatively charged.

Claim 2 has been amended to recite that the phytase enzyme does not include acid phosphatase in step (a) of claim 1.

Claim 4, as it depends from claim 3, has been amended to recite that the phytase enzyme as it is used in step (a) of claim 1 includes acid phosphatase.

No new subject matter is believed to have been added by way of these amendments.

### **Claim Rejections**

### **Claim rejections – 35 U.S.C. 112, 2<sup>nd</sup>**

The Examiner has raised an objection to the term “the neutral components” in claim 1, line 11 as lacking antecedent support.

Claim 1 has been amended in order to replace “the neutral components” with “neutral fractions”. Furthermore, “neutral fractions” is referred to by way of an indefinite article. It is respectfully submitted that there is sufficient antecedent support for the term “neutral fractions” in the description at page 2, lines 20-22.

### **Claim rejections - 35 U.S.C. 112, 1<sup>st</sup>**

The Examiner has raised an objection to claim 2 on the basis that the specification does not provide enablement for a process for producing inositol from plant material using a phytase enzyme that does not include acid phosphatase.

Claim 2 has been amended to further particularize that it is the phytase enzyme in the step of treating the aqueous slurry that does not include acid phosphatase, more particularly step (a) in claim 1. This feature is adequately described in the description at page 3, line 19 to page 4, line 2. At line 21, the description provides that the source of phytase used preferably contains little or no acid phosphatase since acid phosphatase will readily hydrolyse IP1 to free inositol, which is not desired at this first step in the process.

Claim 4, as it depends from claim 3, has also been amended to recite that the phytase enzyme includes acid phosphatase. Many commercially available enzyme packages are not pure and contain trace amounts of acid phosphatase. As such, in some cases it is necessary to adjust reaction conditions in order to ensure partial hydrolysis of phytate in the presence of acid phosphatase in the phytase enzyme used in step 1(a). Such reaction conditions include maintaining a pH between about 3.0 - 7.0 as recited in claim 3.

In response to the Examiner's objections, Applicant submits that claim 2 is now enabled since it has been limited to the step described in claim 1 (a) . The step described in claim 1 (d) provides for the complete hydrolysis of inositol phosphates in the ionic fraction. Step (d) can be done in the presence of enzymes such as phytase or acid phosphatase or even without enzyme based catalysis under controlled conditions of temperature, pressure and pH as is known in the art. This is described at page 5, lines 9-20 of the description. Furthermore, Applicant is enclosing a reference by way of an Information Disclosure Statement entitled "Preparation of Inositol Phosphates from Sodium Phytate by Enzymatic and Nonenzymatic Hydrolysis" for the Examiner's information describing non-enzymatic hydrolysis of phytate.

### **Claim rejections – 35 U.S.C. 103**

Claims 1, and 3-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Wong, in view of Rabinowitz, as evidenced by Nevalainen. Applicant respectfully traverses the rejections as follows.

Wong teaches the use of acid phosphatase and optionally phytase in a protein containing vegetable slurry by washing the slurry to remove solubles to increase the protein content of the residue. However, Wong teaches to degrade enzymatically all of the ribonucleic acids and phytic acid in the protein material and promote full solubility such that all of the non-protein concentrate is in the aqueous phase. The protein content of the residue is thereby increased. This is very different from the present invention wherein step (a) in claim 1 only teaches partial hydrolysis of the phytate. The core of the invention is to use a method for the partial hydrolysis of phytate to charge intermediates, separate these charged intermediates from the neutral sugars in solution and then complete the full hydrolysis to neutral inositol that can be readily separated from charged ions and compounds. It is submitted that Wong does not teach any of the process steps disclosed in claim 1 (a)- (e) of the present invention.

Rabinowitz and Nevalainen must not only teach what is recited in claim 1, and 3-20 but must also teach what is believed to be missing from Wong.

Rabinowitz teaches a method of selectively removing sugars from a mixture of sugars and sugar alcohols as well as purifying cyclitols. Rabinowitz teaches passing plant juice extracts through column chromatography using a DMSO:water gradient. Rabinowitz teaches a very sophisticated and complex separation system. The physical properties of inositol, both in size and charge, are very similar to that of common low molecular weight sugars such as glucose, fructose and sucrose that are present in the mixture. As such, Rabinowitz was trying to solve the problem of separating the inositol molecules from these other neutral sugar molecules in the mixture.

On the other hand, the present invention teaches prior separation of the neutral sugars from charged inositol phosphate intermediates. According to the present invention the inositol phosphates are negatively charged after partial hydrolysis in step 1(a). As such the inositol phosphate intermediates products of partial phytate hydrolysis are charged and are in solution along with neutral sugars such as glucose, fructose and sucrose. The charged state of the inositol phosphates allows for tremendous ease of separation from neutral sugars in solution using known and simple separation techniques that are based on the physical property of electrical charge of the components of the solution. After the charge based separation is complete, the ionic fraction containing the inositol phosphates and other charged ions and molecules is subjected to full hydrolysis of the inositol phosphates to yield inositol plus inorganic phosphate. The result is the formation of the neutral sugar inositol in a fraction containing charged compounds and ions. The neutral inositol compound can then be separated in a pure form from the charged components of the solution using the same charged based separation techniques. Rabinowitz fails to teach slurring a plant material, partial hydrolysis to generate inositol phosphate intermediates, and separating the soluble fraction from insoluble fraction. Rabinowitz also fails to teach separating negatively charged inositol phosphates from the other neutral components. Rabinowitz fails to teach any of the steps disclosed in steps (a) to (e) of claim 1 of the present invention. Furthermore,

Rabinowitz fails to teach what is missing from Wong or Nevalainen, as discussed below.

Nevalainen teaches a recombinant combination strain that contains genes for phytase and acid phosphatase activities. Nevalainen teaches mixed cell cultures that may be constructed so that the cells release a desired ratio of phytase enzyme activity to pH 2.5 acid phosphatase enzyme activity (in other words, having a pH optimum for mediating hydrolysis of a phosphate ester in a substrate at pH 2.0-2.5). Formulating such a mixture of enzymes in the desired ratios, confers upon the mixture the property of cooperative enzyme activity that effectively catalyses the near complete hydrolysis of phytate to inositol.

This is completely different from the partial hydrolysis in step (a) of the present invention which is preferably carried out in the absence of acid phosphatase, and to the extent that acid phosphatase is present, the pH is adjusted to be above 2.5 (as taught by Nevalainen) and more specifically between 3.0 and 7.0 in order to avoid substantial hydrolysis by acid phosphatase. Later in step (d), of the present invention full hydrolysis is performed of inositol phosphate to neutral sugar which can also be accomplished via non- enzymatic hydrolysis. Nevalainen does not teach the step of slurring the plant material, partial hydrolysis of phytate with the goal of generating charged inositol phosphate intermediates, separating the soluble fraction from the insoluble fraction, charge based separation, followed by full hydrolysis of the inositol phosphates, and separating the inositol from the ionic fraction. The enzyme mixture and its cooperative enzymatic activity in Nevalainen are not equivalent to the separate hydrolysis steps disclosed in the present invention. Furthermore Nevalainen does not teach what is missing from Wong and Rabinowitz.

Claims 3- 20 being ultimately dependent on claim 1 are also believed to be patentably distinguished over Wong, in view of Rabinowitz as evidenced by Nevalainen and further as being patentably distinguished over Nevalainen, in view of Wong and further in view of Rabinowitz.

For the foregoing reasons, it is submitted that the references alone or in combination do not teach what is claimed in the present invention.

The Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1, 3-20 under 35 USC 103(a), as being unpatentable over Wong, in view of Rabinowitz as evidenced by Nevalainen.

Further the Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1, 3-20 under 35 USC 103(a) as being unpatentable over Nevalainen, in view of Wong and further in view of Rabinowitz.

### **Summary**

Applicant requests early reconsideration and allowance of the present application.

Respectfully submitted,



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